

DOE JGI Plant Genomics Program

Jeremy Schmutz (jschmutz@hudsonalpha.org) ^{1,2*}, Jarrod Chapman², David Goodstein², Jane Grimwood^{1,2}, Uffe Hellsten², Jerry Jenkins¹, Gerald A. Tuskan^{2,3}, Jim Bristow², Kerrie Barry², Daniel S. Rokhsar² and **Edward M. Rubin²**

¹ DOE JGI HudsonAlpha Genome Sequencing Center, Huntsville, AL, USA

² DOE Joint Genome Institute, Walnut Creek, CA, USA

³ Biosciences Division, Oak Ridge National Laboratory, Oak Ridge, TN, USA

Project Goals:

The goal of the DOE JGI Plant Genome Program is to shed light on the fundamental biology of photosynthesis and transduction of solar to chemical energy. Other areas of interest include characterizing:

- 1) Ecosystems and the role of terrestrial plants and oceanic phytoplankton in carbon sequestration.**
- 2) The role of plants in coping with toxic pollutants in soils by hyper-accumulation and detoxification.**
- 3) Feedstocks for biofuels, e.g., biodiesel from soybean; cellulosic ethanol from perennial grasses and trees.**
- 4) The ability to respond to environmental change (e.g., loss of diversity associated with changes in temperature or moisture availability; nitrogen fixing nodules in legumes reduce fertilizer need).**
- 5) The generation of useful secondary metabolites for positive/negative pest control in natural ecosystems with attendant influence on global carbon cycle.**

The Plant Genome Program contributes to and accomplishes these goals through the following activities:

Sequence. Produce genome sequences of key plant (and algal) species to accelerate biofuel development and understand response to climate change.

Function. Develop datasets (and synthetic biology tools) to elucidate functional elements in plant genomes, with special focus on handful of "flagship" genomes.

Variation. Characterize natural genomic variation in plants (and their associated microbiomes), and relate to biofuel sustainability and adaptation to climate change.

Integration. Provide a centralized hub for the retrieval and deep integrated analysis of plant genome datasets.

JGI plant projects are initiated directly from three major sources: DOE facilities such as the BioEnergy Research Centers; the DOE scientific research communities via the JGI Community Sequencing Program; and JGI Plant Program Projects directed at the improvement of community resources for DOE plant science. These projects fall into broad scientific categories including: plant *de novo* genome sequencing and

improvement, diversity and population analysis, transcript profiling with RNA-seq , and mapping and recombination analysis of populations.